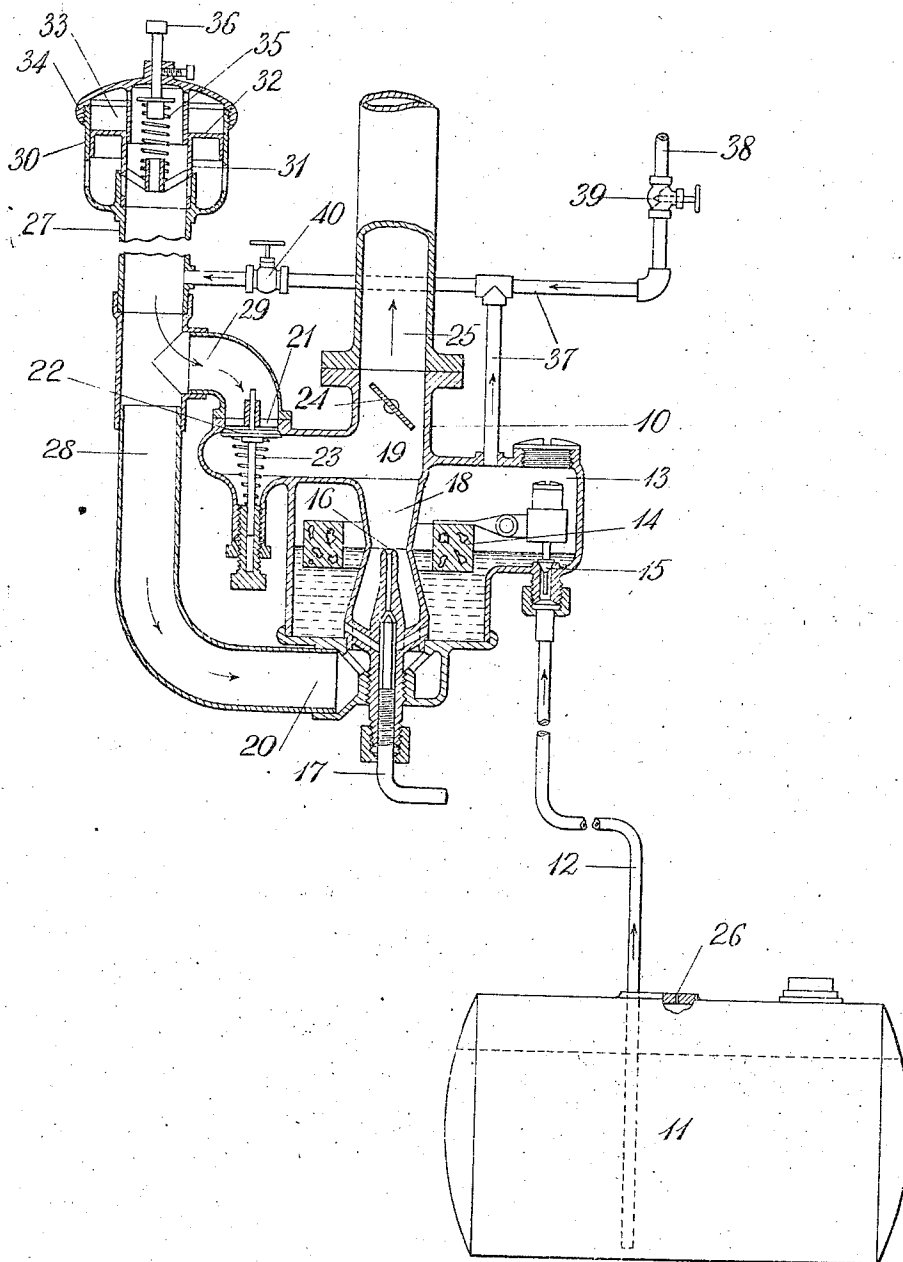


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VACUUM FUEL FEEDER AND CARBURETER.
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1,041,662.

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UNITED STATES PATENT OFFICE.

EDWARD P. NOYES, OF WINCHESTER, MASSACHUSETTS.

VACUUM FUEL-FEEDER AND CARBURETER.

1,041,662.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWARD P. NOYES, a citizen of the United States, residing at Winchester, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Vacuum Fuel-Feeders and Carbureters, of which the following is a specification.

This invention relates to jet carbureters or atomizers of the constant-level type adapted to supply a combustible mixture for an explosion motor, and it relates more particularly to the control of air pressures therein and the application of the motor suction to the purpose of lifting fuel to the carbureter reservoir by atmospheric pressure.

My invention provides improved means for automatically maintaining a uniform suction or partial vacuum in the float-chamber or other constant-level reservoir of the carbureter regardless of what may be the position of the throttle-valve (when the motor is governed by throttling), and it further provides for establishing, when desired, a pressure in said reservoir, which is uniformly higher than that at the air inlet or inlets of the mixing-chamber, and is subject to regulative adjustment in its relation to said inlet pressure.

My object is to embody these improvements in such a form that they may be applied to carbureters of the types in common use.

The accompanying drawing represents a vertical sectional view of a carbureter and fuel feeder provided with my improvements.

10 represents the carbureter as a whole, and 11 represents the main fuel-supply tank connected by a fuel-pipe 12 with the reservoir or float-chamber 13 of the carbureter, said float-chamber containing the usual float 14 and valve 15 controlled thereby, for maintaining a pool of the liquid fuel at a constant level, and having an outlet by way of an open jet-nozzle 16, provided with a needle-valve 17, into the primary air-passage 18 which forms a part of the mixing-chamber, the latter being designated generally by numeral 19. The float-chamber 13 is or may be substantially sealed against uncontrolled air vents or leakages.

20 is the primary air inlet extended to embrace the jet-nozzle 16 and connect with passage 18 for aspirating the fuel, and 21

is the secondary air inlet to the mixing-chamber, said secondary inlet having the usual automatic valve 22 loaded by a spring 23 and designed to open when the pressure in the mixing-chamber has fallen somewhat below the pressure at the inlets 20 and 21.

24 is the ordinary throttle-valve, located in the mixture pipe 25 which leads to the motor, for the purpose of controlling the performance of said motor.

It will be noted that tank 11 is below the level of the carbureter reservoir and is provided with a vent aperture 26 for admitting atmospheric pressure to the surface of the fuel in said tank. Heretofore the supply tank has usually been located above the carbureter so as to feed thereto by gravity (which involves liability to flooding and is sometimes an inconvenient location), or if situated below the carbureter, then the fuel has usually been pumped up, or forced up by gaseous pressure in the tank furnished by means such as an air-pump, or the motor exhaust or cylinder-pressure. Prior force-feed methods have been open to various objections affecting their reliability, uniformity of pressure, the amount of additional apparatus required, etc., many of which, as well as the undesirable features of gravity-feed, are overcome by the method which I here propose of utilizing the motor suction for supplying fuel to the carbureter. In order to do this, having in the supply tank 11 atmospheric pressure or some lower but nearly-related derivative thereof, as distinguished from a pumped or other superatmospheric artificial pressure, it is necessary to establish a partial vacuum in the float-chamber 13.

27 is an air pipe having outlet branches 28, 29 leading to the primary and secondary inlets of the carbureter, and having an inlet branch provided with an automatic loaded-valve device 30 whose operation in a general way is equivalent to that of the secondary air-valve 22. Valve device 30 however commands, either directly or indirectly, the pressure of all of the air passing to the mixing-chamber 19, and I prefer to construct it with a balanced valve 31 which controls the inlet to pipe 27 and is provided with a piston or septum 32 having on its lower side the pressure of the external atmosphere tending to open the valve, and on its upper side, in a chamber 33 of the valve casing 34, the pressure of pipe 27 assisted

by that of a spring 35, tending to close said valve. In various prior patents I have described the construction of a valve of this type, and its details are here unimportant.

5 The range of valve 31 may be small in comparison to the length and stiffness of spring 35, and the device 30 will then automatically maintain the pressure in pipe 27 at a substantially constant reduction from that of the atmosphere, the amount of which reduction depends on the weight of the moving parts and the pressure of spring 35. The latter is subject to alteration by means of an adjusting member 36.

10 37 is a vacuum duct connecting the upper space of float-chamber 13 with pipe 27, and having an inlet 38 from the atmosphere controlled by a valve 39.

40 is a valve controlling the flow of air through this duct, and it will be noted that the portion of said duct between the valves 39 and 40 is virtually a part of the air space of the float-chamber. By adjusting valve 39 to a small opening and partially shutting the valve 40 there may be established in the upper part of the float-chamber, when an air-flow is induced by the motor, a pressure which is a mean between the atmospheric pressure and that in the pipe 27, and so long as the pressure in 27 remains substantially constant the pressure in the float-chamber will also remain substantially constant.

It will be readily seen that the pipes 27, 37 and their appurtenances, can be furnished as an attachment to many existing types of carbureters, and the invention would further require only that the float-chamber, which usually has one or more uncontrolled air vents, should be sealed substantially airtight. The invention, however, could also be embodied in a carbureter specially constructed throughout.

For the purpose of obtaining a differential pressure between the tank 11 and float-chamber 13 sufficient to lift the fuel through a moderate vertical distance, the spring of valve-device 30 is adjusted to impose a moderate degree of throttling upon the air entering the pipe 27, and this reduced pressure, which may for example be one pound below atmosphere, is communicated to the float-chamber through the duct 37. The amount of the required differential will depend on the height through which the fuel is to be lifted to the carbureter, and since an ordinary explosion motor is capable of affording a vacuum of about half an atmosphere in its suction pipe, it is evident that the fuel could be lifted through a considerable distance. But in order that the maximum power of the motor shall not be greatly reduced, a comparatively light adjustment of spring 35 is advisable for normal running. With any fixed adjustment of this

spring the automatic action of the valve maintains the differential substantially constant and hence yields a uniform fuel-supplying force.

By manipulating the adjusting device 36 it is of course possible to exercise a control over the power and speed of the motor in place of, or auxiliary to the control exercised by the posterior throttle-valve 24, but in general, and particularly with carbureters having float-valve arrangements of the ordinary type, and where the pressure in the tank 11 is not controlled, I prefer to use the throttle-valve 24 for motor control, because a large effective differential between the tank and the float-chamber imposes an amount of work upon the float 14 which it might not be able to sustain unless the valve or its connections with the float are specially designed to prevent flooding.

If valve 39 is closed and valve 40 opened, the air pressure in float-chamber 13 will be the same as that in pipe 27, so that the conditions of the ordinary carbureter are reproduced with an artificial atmosphere. With valve 39 slightly opened and valve 40 partly closed, a small current of air passes through the duct 37 into pipe 27 and is choked by valve 40 so that the pressure in the float-chamber is above that in the pipe 27 and the needle valve 17 may be screwed farther in, or the aperture of the jet nozzle 16 otherwise reduced, to allow for the increased pressure-difference between the float-chamber and the mixing-chamber, but the pressure in the float-chamber may still be low enough to provide the necessary suction for lifting the fuel from tank 11. On the other hand, tank 11 might be raised above the carbureter or provided with any of the usual force-feed devices and the pressure in the float chamber could be raised to that of the atmosphere by opening wide the valve 39, in which case the uniform reduction of pressure caused by valve device 30 would insure an adequate supply of fuel to the mixing chamber 19 under all conditions. It is well known that carbureters which have an uncontrolled air inlet from the atmosphere to the mixing-chamber are deficient in this respect and often have to be primed or flooded when the motor is first started. Valve 40 can either be closed or partly opened, and the relative adjustment of it and valve 39 varied so as to provide a variable mean pressure in the float-chamber for the purpose of regulating the composition of the mixture, thus affording a substitute for or auxiliary to the variation of mixture composition accomplished by adjusting the fuel valve 17. This improved method of regulating the mixture composition may also be practised when the parts are adjusted to raise the fuel to the carbureter by suction.

I claim,—

A carbureter comprising a fuel reservoir provided with a constant-level device, a mixing chamber having a fuel inlet from
5 said reservoir and primary and secondary air-inlets, the secondary inlet having an automatic loaded valve, an air pipe having outlet branches to the respective air inlets and an inlet branch, an automatic loaded
10 valve controlling said inlet branch, and a

vacuum pipe connecting the upper part of the fuel reservoir with said air pipe.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses, this fifth day of September 1911. 15

EDWARD P. NOYES.

Witnesses:

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